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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/158,099	09/22/1998	KENJI MIWA	0163-0707-2X	3529
22850	7590	06/21/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			LIN, KUANG Y	
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 06/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/158,099

Applicant(s)

MIWA ET AL.

Examiner

Kuang Y. Lin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 15, 18, 20-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15, 18 and 20-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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1. Claims 15, 18 and 20-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 15, lines 6-7, it recites "at a current value and a Tesla value". In claim 15 line 11 and claim 21, last line, respectively, it also recites "at a current value and a Tesla value". It is not clear whether they refer the same or different current value and Tesla value.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 15, 18 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vives

Vives discloses a grain refinement method for aluminum alloy (page 448, left col., last paragraph and right col., 4<sup>th</sup> complete paragraph) by applying an electric current and a magnetic field simultaneously (page 446, right col., 3<sup>rd</sup> complete paragraph and the junction paragraph between pages 447 and 448) to the molten aluminum alloy during a solidification process at temperature lower than a liquidus of the alloy (page 446, right col., last paragraph, page 447, right col., second complete paragraph and page 449, right col., 1<sup>st</sup> complete paragraph). Although he does not mention the feature of shifting a refined material to a periphery of a container to yield the refined material concentrated in an end portion of the metallic material, apparently, his process will produce the same result as that of applicants since he performs the identical process steps as that of applicants. In short, Vives substantially shows the invention as claimed except that he does not show the container is in cylindrical shape. However, it would have been obvious to use the container of any configuration in the process of Vives depending on the designated metallic casting article to be obtained.

5. Claims 15, 18 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radjai et al and further in view of Vives.

Radijai et al substantially show the invention as claimed except they does not disclose to crush solid crystals into small pieces during a solidification process at

temperatures lower than the liquidus. However, Vives discloses two distinct causes of grain refinement, represented by fluid flow and cavitation phenomena, in a solidifying liquid metal (see page 448, right col. last paragraph). In the absence of cavitation and for a sufficient intensity of the oscillating flow, the columnar-dendritic crystallization is replaced by a microstructure characterized by the formation of agglomeration of globular particles. On the other hand, when an alloy is solidified in the presence of well-developed cavitation situations, a very fine and homogeneous microstructure has been observed throughout ingot (see page 449, right col. second paragraph and page 454, left col. second paragraph). He also discloses that gas content in the liquid metal (see page 449, left col. second paragraph) and the intensity of magnetic pressure contributed to the cavitation phenomena (see page 449, left col. last paragraph through page 449, right col. last paragraph). It would have been obvious to manipulate the gas content of aluminum alloy and the magnetic pressure during the solidification process of Radjai et al in view of Vives such that to obtain well-developed cavitation situations in the molten metal at the temperature lower than the liquidus and thereby to better refine the grain structure. It would have been obvious to use the container of any configuration in the process of Vives depending on the designated metallic casting article to be obtained.

6. Applicant's arguments filed May 23, 2005 have been fully considered but they are not persuasive.

- a. In page 7, 1<sup>st</sup> paragraph and junction paragraph between pages 7 and 8 of the remarks applicant stated that in the process of Radjai the silicon carbide particles is added to the molten metal and the particles of the instant application is smaller than that of Radjai. However, applicant did not provide any evidence for supporting the allegation.
- b. In page 8, 1<sup>st</sup> complete paragraph of the remarks applicant stated that the purpose of Vives' study is different from that of instant application and thus fails to disclose or suggest applicant's shifting step as claimed. However, since Vives also provide an alternating electric current and a magnetic field to the solidifying molten metal as applicant did, it is expected that Vives also will have a shafting step, even through the intensity of shifting might be different.
- c. In page 8, last paragraph of the remarks applicant stated that Vives' vessel has free surface. However, applicant failed to provide any evidence for supporting the allegation. Further, the instant specification does not disclose that there is no free surface in applicant's tube or container. Furthermore, the scope of the claim does not exclude that the vessel has free surface.
- d. In page 9, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs of the remarks applicant stated that the vessel of Vives' is made of stainless steel and magnetic strength in his process is about 1/10 of the instant process. However, the scope of the claim does not exclude the vessel being made of stainless steel and the claim does not provide a limitation on the strength of the magnetic field. Also, applicant failed to provide any evidence that there is no shifting step in Vives' process. Furthermore,

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applicant stated that the shape of the container or vessel is a very important element to generate the shifting step. However, figure 3 of the accompanied drawings does not show why the shape is critical.

**7. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

**8.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuang Y. Lin whose telephone number is 571-272-1179.

The examiner can normally be reached on Monday-Friday, 10:00-6:30,.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas X. Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kuang Y. Lin  
Primary Examiner  
Art Unit 1725

6-13-05